



Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at <http://about.jstor.org/participate-jstor/individuals/early-journal-content>.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

THE BRYOLOGIST.

VOL. X.

SEPTEMBER, 1907

No. 5.

FURTHER NOTES ON CLADONIAS. XII.

Cladonia bacillaris, *Cladonia macilenta* and *Cladonia didyma*.

BRUCE FINK.

With this number of the series we pass from the brown fruited *Cladonias* to those commonly having scarlet apothecia. Of the three considered in this paper, the first two are so closely related as to render their separation most difficult and uncertain. The difficulties to be encountered are discussed at length under the description of the second species. The third of the three lichens is closely related to the other two, but the character of the squamules, especially the minute ones of the podetia when present, usually will serve to differentiate sufficiently. Tuckerman has referred to this plant as "Not a little resembling *C. bellidiflora* in miniature," but none of the specimens known to the writer need be mistaken for this species.

All three of the plants considered resemble *Cladonia cristatella* in general form, but that species has the podetia uniformly corticate.

To illustrate the first two species, we have chosen for *Cladonia bacillaris* a specimen from northern Minnesota, and for *Cladonia macilenta* one of L. Scriba's plants, collected in Germany.

CLADONIA BACILLARIS (Del.) Nyl. Lich. Lapp. Cr. 179. 1866. Primary thallus persistent or finally dying, composed of lacinate, lobate or crenate squamules, which are 1-3 mm. long, and about 1 mm. wide, flat or somewhat involute, scattered or clustered, sea-green or varying toward whitish or olivaceous above, and wholly white below or darker toward the base of the squamules, sometimes sorediate along the margin and below. Podetia arising from the surface of the squamules: quite slender, subcylindrical, rarely enlarged toward the apex; 5-55 mm. long and 0.5-2 mm. in diameter or even 4 mm. at the apex; cupless or rarely with very poorly developed cups; simple or rarely branched; often sterile and the apex obtuse or rarely subulate, or terminated by imperforate clustered or solitary apothecia; erect, the greater part or entirely sorediate, sometimes squamulose toward the base, and the squamules frequently occurring half way up or rarely even to the top, often corticate toward the base and below the apothecia, ashy, sea-green or olivaceous or a mixture of these colors. Apothecia medium sized, 1-5 mm. in diameter, solitary or clustered, immarginate or rarely margined, usually convex, scarlet. Hypothecium pale. Hymenium reddish toward the top and paler toward the lower part. Paraphyses simple or branched toward the thickened and reddish apex. Asci cylindrico-clavate. Spores obliquely disposed. Plate X. Figs. 1a and 1b.

On earth, old logs or stumps, found usually in rather open and dry places.

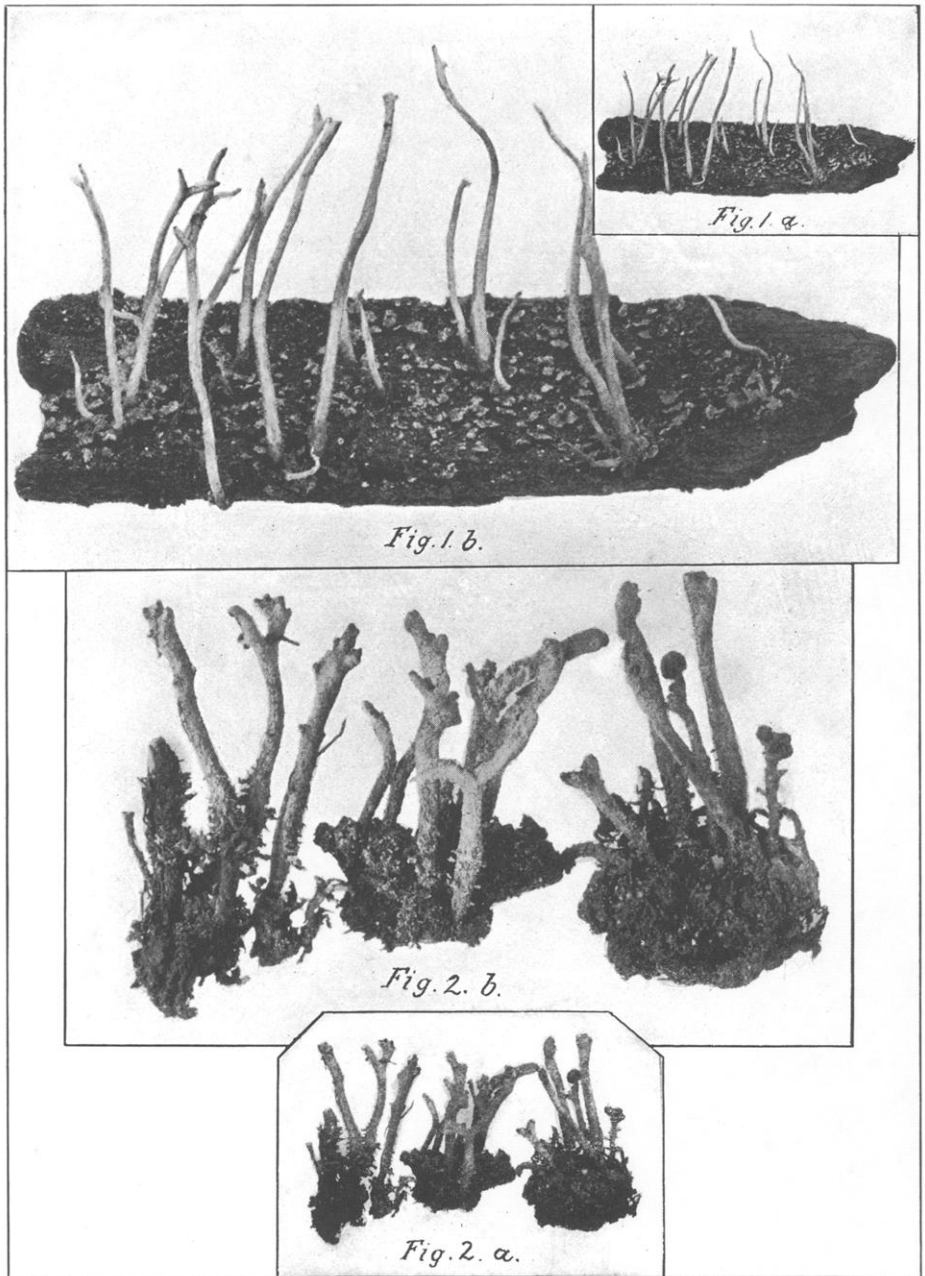


PLATE X—*Cladonia bacillaris*. Fig. 1a Nat. Size, Fig. 1b $\times 3$
Cladonia macilenta. Fig. 2a Nat. Size, Fig. 2b $\times 2$

Examined by the writer from New Hampshire (R. H. Howe, Jr.), Illinois (C. P. Clinton, for whom determined originally by the writer as *Cladonia macilenta*), Iowa, Minnesota and Washington (Bruce Fink), Tennessee (W. W. Calkins, who determined as *Cladonia macilenta*), New York (Carolyn W. Harris), Mexico (J. G. Smith and named *Cladonia mitrula* by T. A. Williams), Newfoundland (A. C. Waghorne and called *Cladonia macilenta* by Dr. F. Arnold). H. Willey lists the species from Massachusetts, and Wainio's distribution adds Ohio, New Mexico and Jamaica. The above lists of localities would indicate quite a general North American distribution, but the plant is little known since it is generally confused with the next. Known in all the grand divisions.

Dr. Wainio gives three forms, of which only the first, *a clavata* (Ach.) Wainio, is at all common. Ours all seem to belong to this form, which should stand for the species

CLADONIA MACILENTA Hoffm. Deutschl. Fl. 126. 1796. Primary thallus persistent or finally dying, composed of laciniate, lobate-laciniate, crenate or rarely subentire, small or medium sized squamules, which are 1-4 mm. long and 1-3 mm wide, flat or somewhat involute, scattered or clustered; sea-green, whitish sea-green or olivaceous above, white below or darker or rarely yellow toward the base of the squamules; the margin and lower side sometimes sorediate. Podetia arising from the surface of the primary thallus, short or elongated, rather slender, subcylindrical or clavate, 5-42 mm. long and 0.5-3 mm. in diameter, cupless, simple or sparsely branched; apices obtuse or impressed, sterile or terminated by imperforate, clustered or scattered apothecia; erect, esquamulose, squamulose toward the base or rarely entirely squamulose; often corticate toward the base and below the apothecia, white or sea-green. Apothecia small or more commonly middling sized, 0.5-2.5 mm. in diameter, solitary or somewhat densely clustered, convex, immarginate or having a thin margin, scarlet. Hypothecium pale. Hymenium red above and pale yellowish below. Paraphyses usually simple, more or less thickened at the pale or reddish apex. Asci clavate or cylindrico-clavate. Spores irregularly arranged. Plate X. Figs. 2a and 2b.

On earth, dead wood, and on soil over rocks. Found especially in rather dry, open places. Examined by the writer from Newfoundland (A. C. Waghorne), Canada (J. Macoun), Iowa and Massachusetts (Bruce Fink). In all these the spores were irregularly arranged, though some of the plants were unbranched forms, otherwise appearing more like *Cladonia bacillaris*. J. Macoun gives many localities in British American, but doubtless part of the material is *Cladonia bacillaris* instead. T. A. Williams lists from Nebraska and the Black Hills. Whether he studied the spore arrangement sufficiently, I am not able to say, but suspect not, as American workers have not usually recognized *Cladonia bacillaris*. H. Willey records from Massachusetts, and says "We have also *C. bacillaris* Nyl. differing only in yielding no reaction with iodine." This statement follows after saying of *C. macilenta*, "podetia yellow with iodine." Willey is here following

Nylander's view of the difference in the two species. H. Willey and W. W. Calkins both record from Illinois, but we have no means of knowing whether the two species were differentiated or not. *Cladonia bacillaris* and *Cladonia macilenta* seem to be scarcely distinct, but herbarium specimens indicate that the latter plant is more robust and more commonly branched. The spore arrangement is not easy to make out and is not always to be depended upon, as the spores may be obliquely arranged in certain asci and irregularly in others of the same plant. Tuckerman recognized only *Cladonia macilenta*, which he gave a wide North American distribution. Judgment as to whether *Cladonia bacillaris* and *Cladonia macilenta* are distinct species must finally be based upon wide study of specimens by the statistical method, taking account of centres and ranges of variation and degree of isolation of various forms encountered. For the present, we can find no better way than to attempt to follow Dr. Wainio, who records the present species from all the grand divisions. It is reasonable to suppose that chemical tests may have some value in differentiating these two closely related species.

Dr. Wainio gives five forms, of which only the first and most common one has been noticed in North America. This we would regard as the species.

CLADONIA DIDYMA (Fee) Wainio Mon. Clad. Univ. 1:137. 1887. Primary thallus disappearing or rarely persistent, composed of minute or medium sized, lacinate or incised crenate squamules, which are 0.5-3 mm. long and 0.12-0.15 mm. in diameter; somewhat involute or nearly flat, scattered or clustered; without soredia, sea-green above, varying toward olivaceous or rarely toward whitish, below whitish, or yellowish toward the base of the squamules. Podetia arising from the surface of the primary thallus; short or somewhat elongated, 1-45 mm. in length and 0.5-3 mm. in diameter; cylindrical and without cups; simple or with erect or divergent branches; erect, clustered or subsolitary; decorticate, or more or less corticate at the base, whitish-sea-green, varying toward whitish or brownish; squamules for most part toward the base or absent; squamules, verrucae, granules or soredia minute. Apothecia medium sized, or rather small, 0.3-2.5 mm. in diameter, solitary or more or less clustered; convex and immarginate, scarlet. Hypothecium pale or cloudy. Hymenium deep red above and pale below. Paraphyses simple, more slightly thickened toward the apex. Asci cylindrico-clavate. Spores irregularly arranged.

On old trunks, earth or rocks. Examined by the writer from Virginia (A. B. Seymour), Louisiana (A. B. Langlois), Florida (W. W. Calkins). The specimens of Calkins and Langlois were submitted to Dr. Wainio. *Cladonia pulchella*, to which these men had referred their specimens, is a synonym. Wainio cites the species from Massachusetts, Alabama, Mexico, Guadeloupe, St. Domingo, Cuba and Martinique. Dr. J. W. Eckfeldt referred one of A. C. Waghorne's plants from Newfoundland here, otherwise our distribution is confined to the United States and the islands. Common also in South America and known in Asia, Africa and Australia.

Dr. Wainio referred the specimens submitted to him to his first form, *Muscigena* (Nyl.) Wainio. Mon. Clad. Univ. 1:141. 1887, which is the common form which may well stand for the species, the only one thus far noted in North America.

Miami University, Oxford, Ohio.